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MODERN DATA COLLECTION TECHNIQUES AND TECHNOLOGIES LiDAR - SPATIAL DATA PROCESSING

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Abstract: The purpose of the project is to build a broadband infrastructure in disadvantaged areas, using structural funds, located in the counties of Caraş-Severin, Timiş, Arad, Bihor, Hunedoara, Sălaj, Satu-Mare. The objective of the project is the design of the distribution network, the construction of the distribution network and the operation of the distribution network. To carry out the topographic measurements, the Trimble MX2 device was used, with two sensors, which combined high-resolution laser scanning and precise positioning to collect a georeferenced point cloud, implemented on the platform of a car. For data processing, the corrections given by an own GNSS station are needed, for trajectory correction the APPLANIXMOBILE MEPPING program was used. The processing of the new points is done with the program TRIMBLE TRIDENT. Based on the collected data, the following topographical plan will be drawn up with the presentation of the relief through measured points of the long route of the road between the property limits, a plan drawn up in the 1970 Stereographic Projection System and the 1975 Black Sea Elevation Reference System and will contain elements of planimetry. The drawn parts will be developed with the help of the AUTOCAD 2006-2010 program.

• Introduction

Since the most distant times, man has posed the problem of terrestrial measurements, different methods being discovered and invented over the centuries, but there was greater development in this field, in the research and discoveries that took place in the 19th century, when all topo grids are displayed, the Gauss system is entered for maps and plans and photometry. The notion of geoid appears only in the 20th century.

LiDAR technology is a laser scanning technology, it is a state-of-the-art remote sensing technology, it is based on the laser measuring technique associated with a high-precision GPS system, all of which is packaged on an aerial or ground platform, providing accurate results. raised on the topography of the land.

• Material and method

The purpose of the project is to build a broadband infrastructure in disadvantaged areas, using structural funds, located in the counties of Caraş-Severin, Timiş, Arad, Bihor, Hunedoara, Sălaj, Satu-Mare.

The objective of the project is the design of the distribution network, the construction of the distribution network and the operation of the distribution network, including the infrastructure associated with them in white areas of Romania, for the provision of broadband electronic communications services.

CSF estimated that 783 localities in the above areas possess the economic potential to generate a local loop business with positive NPV, for broadband internet access services, in a period of at least 7 years, thus the 783 located have become eligible for the construction of distribution networks through the intervention of public funds, they being called target areas.

LiDAR sensors use an active, light signal to measure the position, given by the X, Y, Z coordinates and reflective properties of a point on an object. In practice this results in a cloud of points with image qualities similar to other remote sensing technologies.

The accuracy of the point cloud data decreases as the distance from the LiDAR sensor increases. The distance that the LiDAR sensor covers is determined by the manufacturer's specifications, the precision sensors (Mita et al., 2020, Pascalaus et al., 2020).

The density of the point cloud is determined by the measuring speed of the sensor together with the speed during the measurement of the platform on which it is mounted. The density of the point cloud must be sufficient to identify and extract the physical details with the precision specified in the project.

• Results and discussions

LiDAR datasets are available in either LAS or ASCII format (Paunescu et al., 2020).

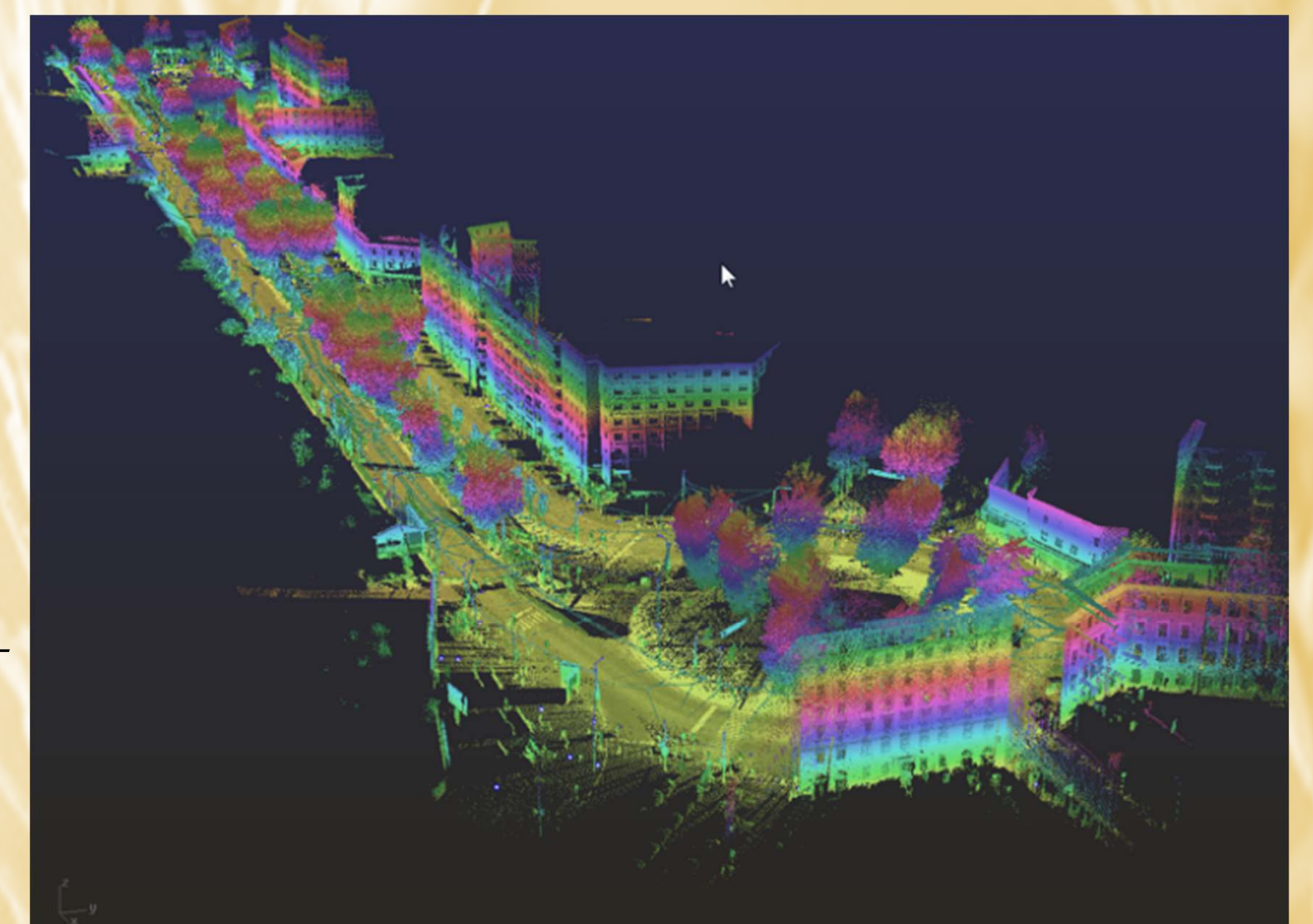
The model for using LiDAR - Mobile Mapping technology for detailed topographic surveys, both in urban areas and in other locations, involves following the workflow below:

1. Field reconnaissance of the studied area to determine how many scans are needed, in our case two scans were done.
2. Scan the area of interest using the Trimble MX2 scanner and a GNSS reference station.
3. Processing the cloud of points, this is done using the Trimble Trident program
4. Post data processing and obtaining data of interest
5. Providing the final result - the drawn parts will comply with the requirements and will be executed with the help of the AutoCAD program 2006-2010.

Two series of data were collected, at different speeds of the platform, the resulting measurement contains files containing the entire trajectory of the machine - POS, files with the actual measurement - TRIDB, together with the cloud of points and the images taken by the camera - CAM (Cartis et al., 2019; Popescu et al., 2020).



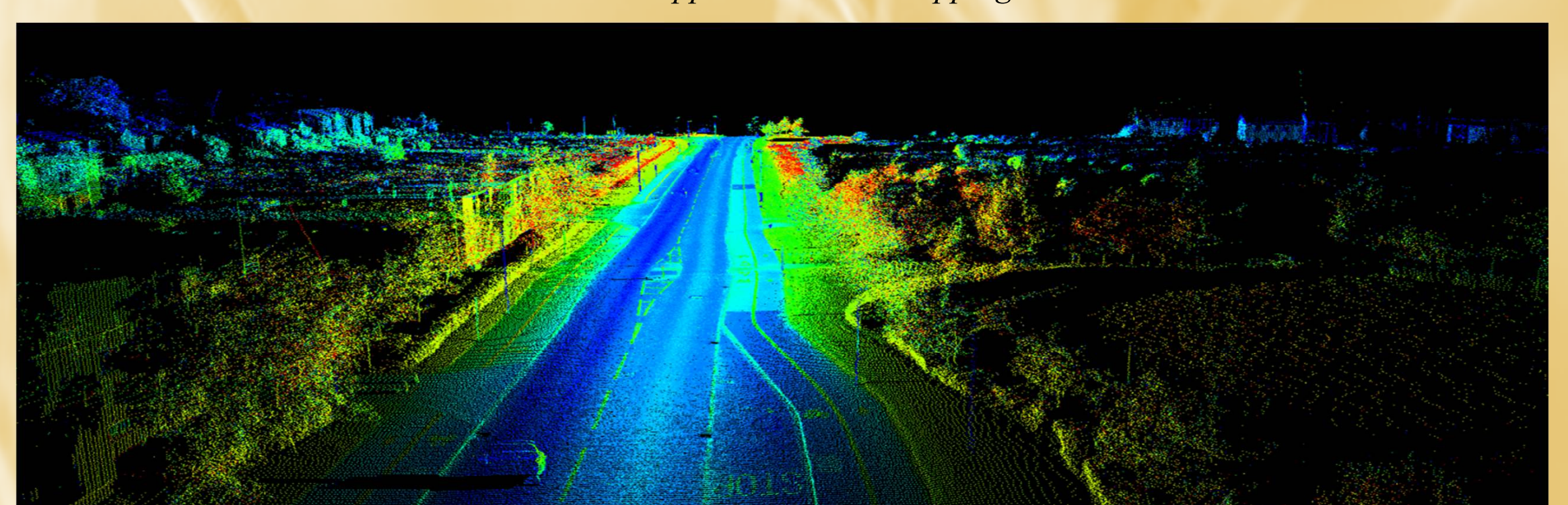
Base station - Trimble Navigation -
Construction Division



Trimble Applanix: Applanix LiDAR QC Tools



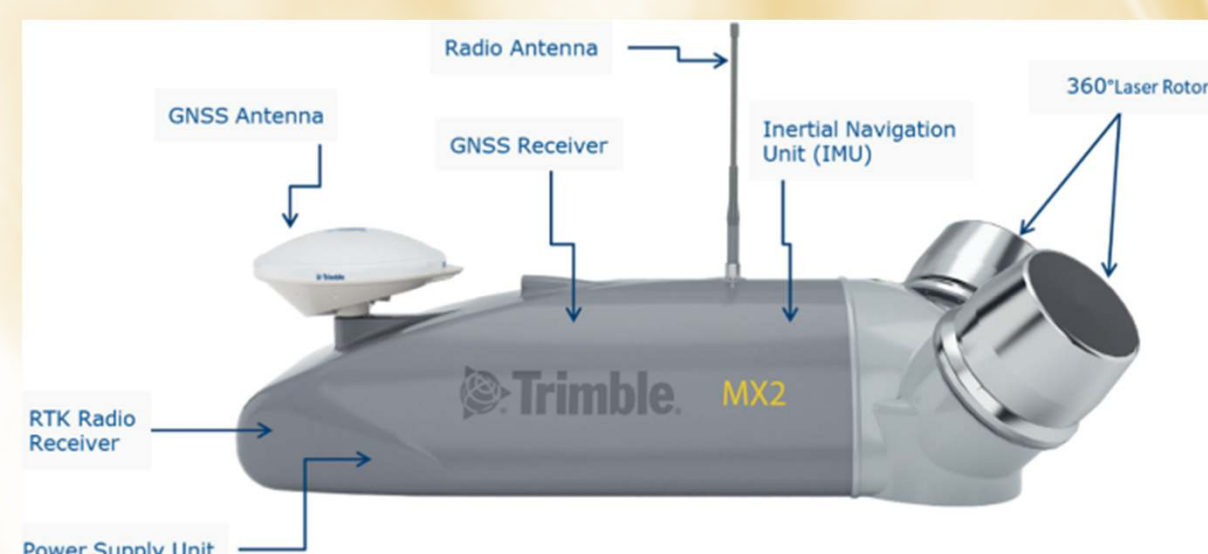
Trimble Applanix Mobile Mapping



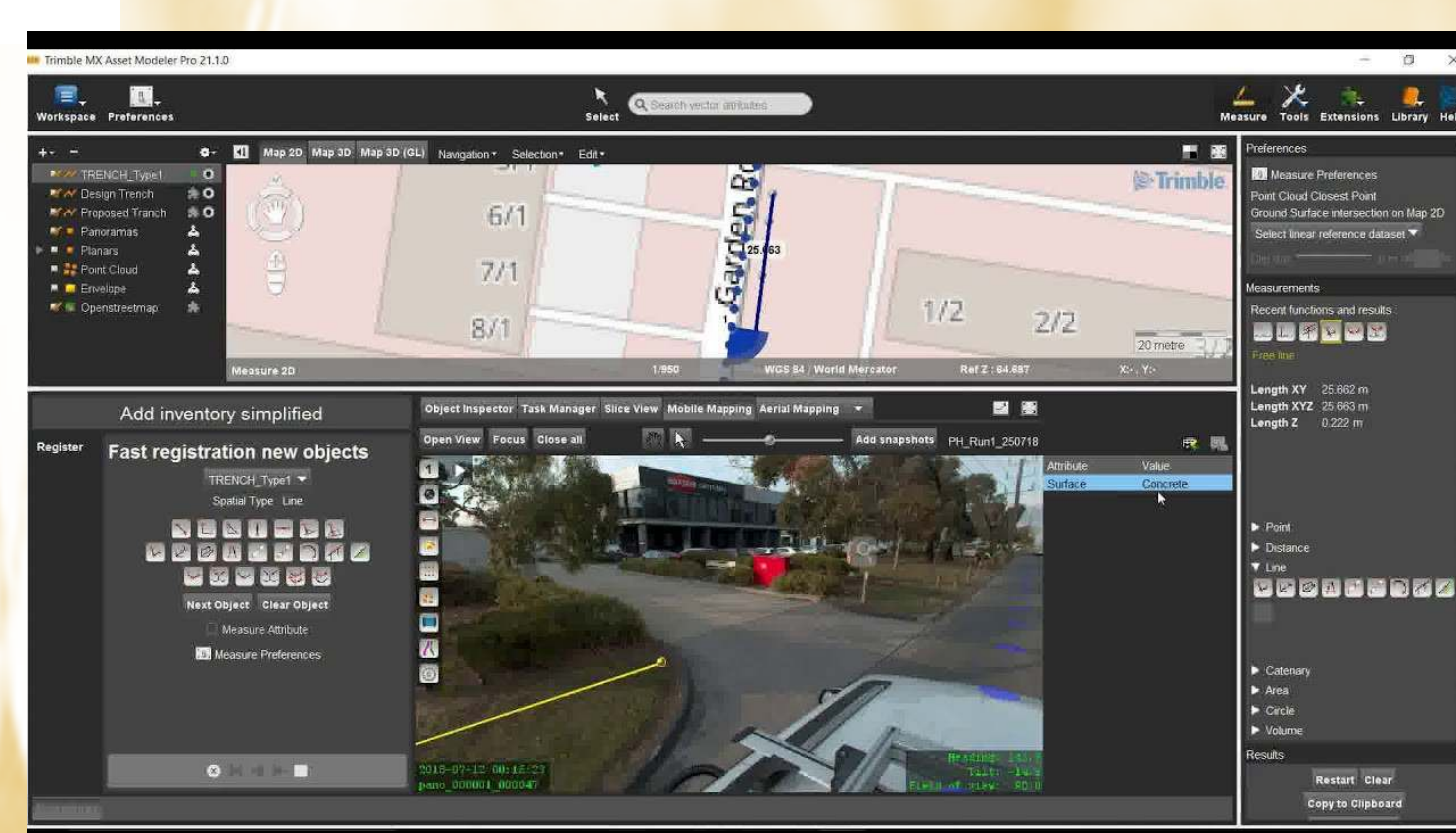
Advanced LiDAR surface surveying and high quality data capture



Scanner laser
TRIMBLE MX2



Trimble Mx with 2 sensors



Trimble MX Mobile Mapping Software

• Conclusions

Based on the collected data, the following were prepared:

- Situation topographical plan with the representation of the relief at points measured along the axis of the road between the property limits.
- The plan is drawn up in the 1970 Stereographic Projection System and the 1975 Black Sea Elevation Reference System and contains planimetry elements, wooden posts, kilometer markers, as well as toponymy elements.

The drawn parts were made with the help of the AutoCAD 2006-2010 program, preparing the following panels:

- The framing plan in the area at a scale between 1:1000 and 1:10000, so as to include the objective of the investment and the location around it
- Situation plans in detail in which elements necessary for the installation of optical fiber will be represented over the topographical support
- Main plans representing the sewage construction
- Panches regarding the construction of new air support.